

Electric Vehicle Developments Overview for the Maryland Electric Vehicle Infrastructure Council



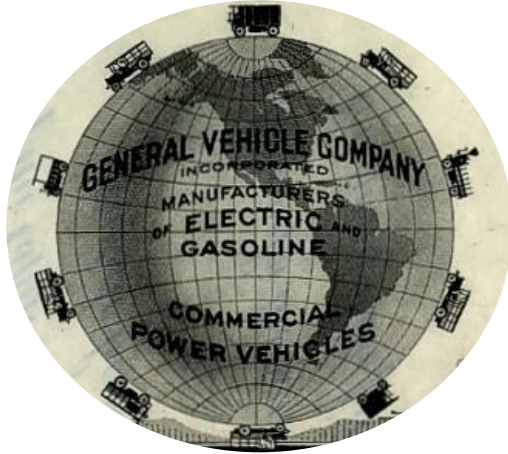
Outline

- Brief background
- Maryland Market Development Update
- Adoption Perspectives
- Electric Grid Implications
- Summary

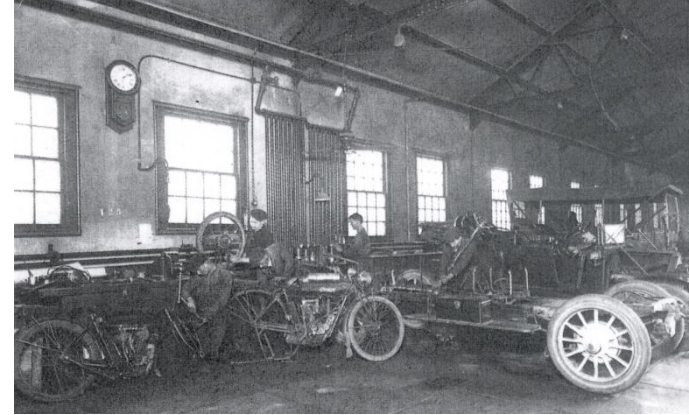
Summary of Key Points

- Electric vehicles have the potential to be a transformational change in the fuel requirements for transportation use
- The transition to electric transportation has the potential to provide significant benefits, including reducing Maryland's dependence on fossil fuels and to significantly reduce the tailpipe emissions on our roads and highways.
- Electric vehicle options are only beginning to appear in the Maryland marketplace. There is a wide range among projections for future potential.
- Electric vehicles present a significant learning experience for consumers, business and government users.
- Electric charging stations will be the new fueling infrastructure for electric vehicles, electric utilities the new supply.
- There is significant progress and good work are underway in Maryland
- Maryland has opportunities to continue to advance EV adoption and to coordinate the many efforts underway

Electric Vehicles have come full circle



BGE's corporate predecessor, the Consolidated Gas Electric Light and Power Company of Baltimore ("the Consolidated" for short), purchased its first fleet of ten electric trucks in 1911 from the General Vehicle Company.



By 1914, the Consolidated had 32 electric trucks and delivery wagons, compared to 25 gasoline trucks and delivery wagons. Electric trucks continued to be used until 1932.

In 1911, Consolidated converted 30 S. Eutaw Street to a charging garage and service station

In 1950, a BGE historian sagely noted, "The electric vehicle had its day, if a brief one; perhaps some day it will return."

Defining Electric Drive Vehicles (EV)

Electricity moves the wheels via a motor powered solely by a battery, or the combination of a battery and an internal combustion engine, small on-board gas generator or a fuel cell.

Grid Connected

- Battery electric (BEV)
- Extended range electric (EREV)
- Plug-in hybrid electric (PHEV)

Non-Grid Connected

- Hybrid / hybrid electric vehicle
- Fuel cell electric vehicle

Adapted from Electric Drive Transportation Association presentation. Jan 27, 2009

Electric Vehicles are becoming a reality

- Chevy Volt and Nissan Leaf now on sale in greater Baltimore – Washington region
 - About 5000 units sold across US in 2011. 2012 model year orders are “brisk”
- Maryland Energy Administration grant funding is facilitating the installation of about 80 - Level 2 charging stations throughout central Maryland. Additional grant solicitations for EV Infrastructure Planning and/or installations also in work.
- Maryland regulators and legislators are strongly supportive and deeply engaged
 - Maryland Legislation authorized PSC to have electric distribution companies develop pilots to encourage off-peak charging and demand response
 - Maryland tax credits approved for EV charging equipment installations
 - MD PSC Working Group – Consideration of Regulation of Electric Vehicle Charging Suppliers initiated work in April 2011
 - Maryland State EV Infrastructure Council to begin in August 2011

Electric Vehicles are coming to Maryland

Passenger Vehicles

Chevy Volt – December 2010

Nissan Leaf – August 2011

Ford eFocus – late 2011 / 2012

Ford PHEV Escape – 2012 / 2013

Mitsubishi iMev – 2012

Toyota PHEV Prius – 2012

Toyota eRAV4 – 2012 / 2013

Coda

Others

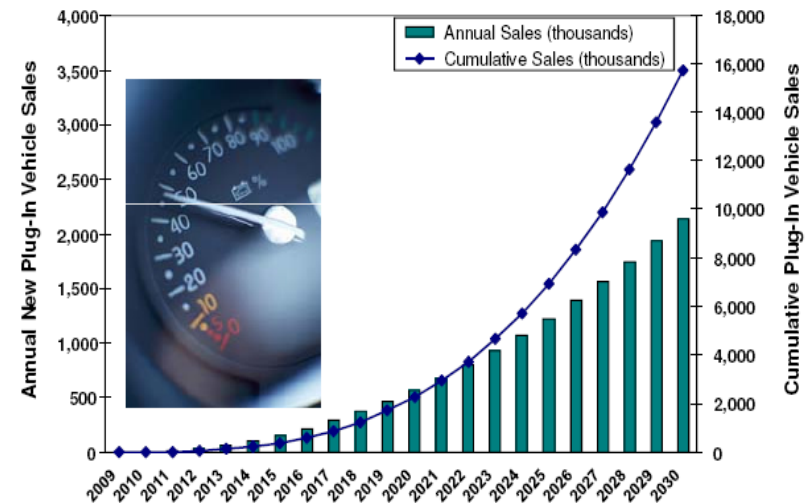


Nearly every major manufacturer and several “new” entrants are expected to have product on the road by 2015.

Driving EV Adoption in US

- \$ 2.4 Billion in federal funding provided to advance market development and production and to incent Plug-in Vehicles (PEV) purchases.
 - Reduce US dependence on foreign oil
 - Create new green economy
- President Obama has renewed his goal to have **1 million** plug-in vehicles on the road by 2015
 - Key factors to achieving this:
 - Product availability
 - Consumer and fleet owner awareness
 - Stakeholder support
 - Manufacturers
 - Utilities
 - Suppliers
 - Policymakers
 - Others

Electric Vehicles Are Coming

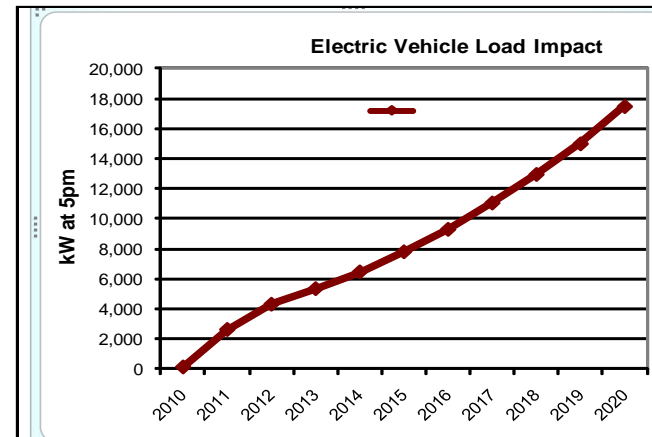
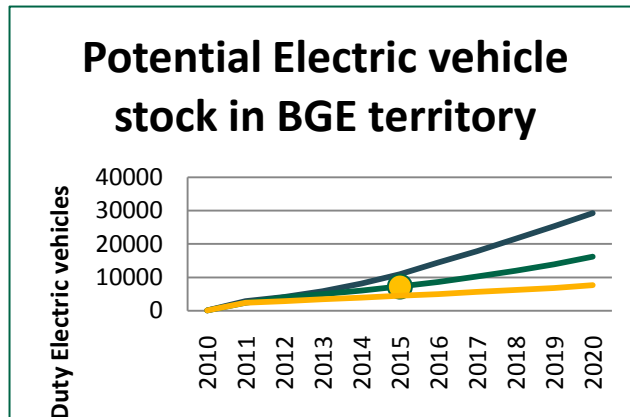


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Maryland and BGE Territory Projections



Initial sales fairly modest in 2010

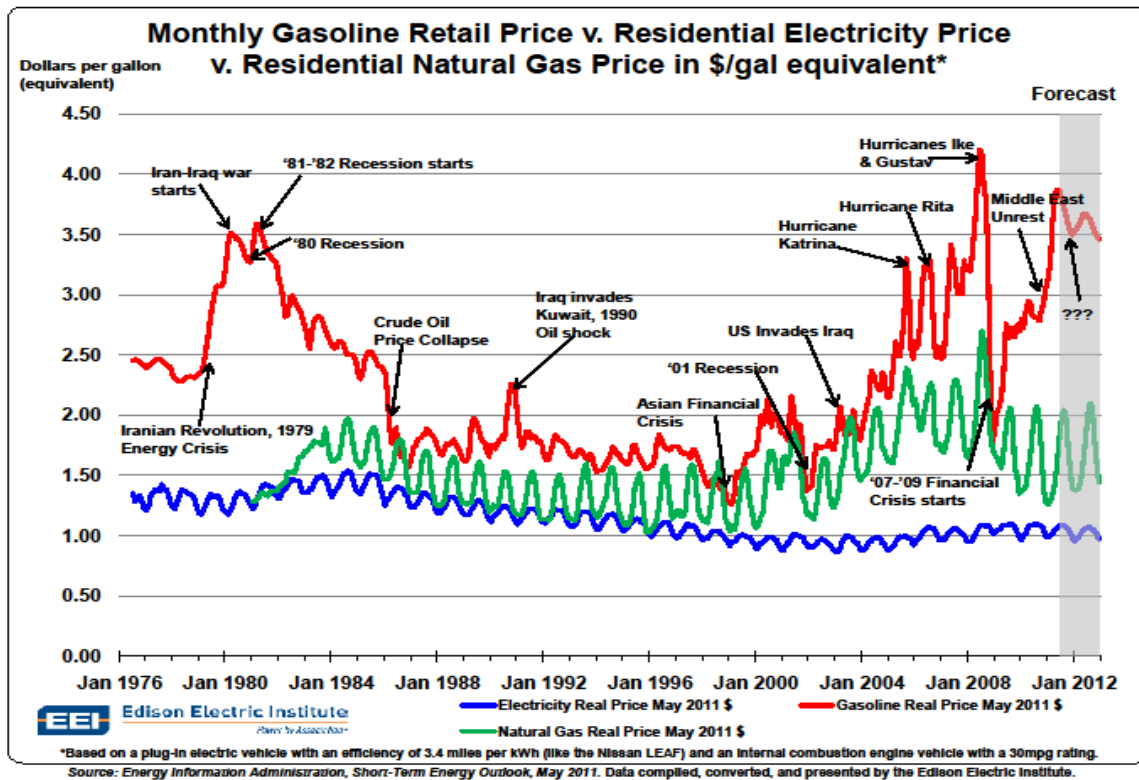
- Primarily due to limited product availability and uncertain financial times

Long term projections vary widely for Maryland – DC area:

- KEMA – IRC Report *projects up to 60,000 Plug-in Electric Vehicles (PEV) in the Baltimore Washington metro area by 2020
- Other studies project as many as 100,000 PEV or more

** KEMA –IRC ISO/RTO Council, Assessment of Plug-in Electric Vehicle Integration with ISO/RTO Systems, March 2010*

Price of Gasoline vs. Electricity as a Vehicle Fuel



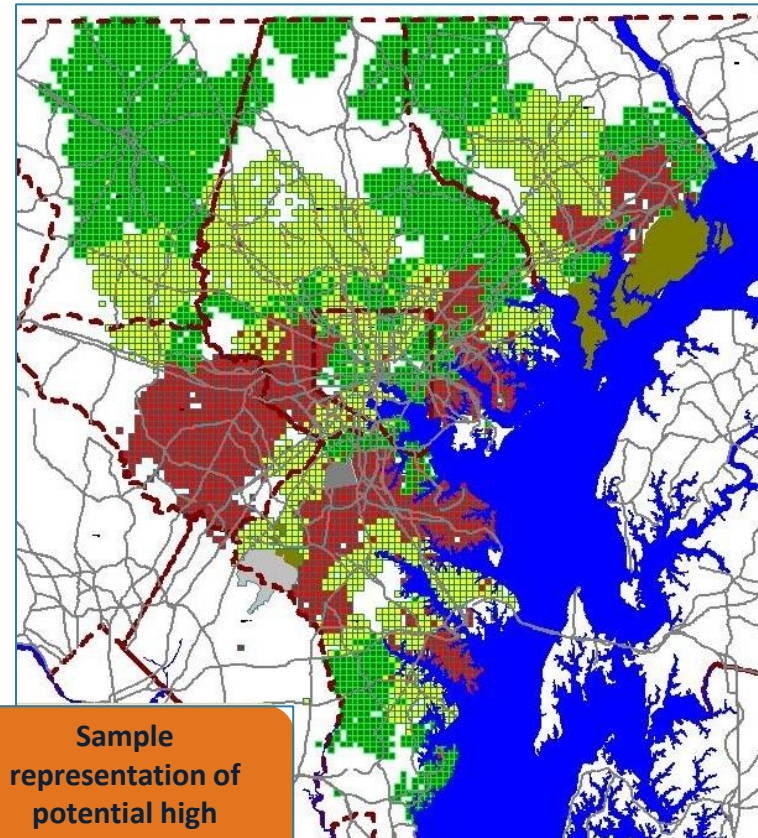
- Price of electric is consistently lower and less volatile than gasoline
- Electric cost* for “40” miles range is about \$1.40 - \$1.70, comparable cost for gasoline is \$3.70 - \$5.00 (at 30 – 40 mpg).

* BGE 2011 average residential rates, 40 miles range for a full recharge of a Chevy Volt

Early Adopters Expected to be in Clusters

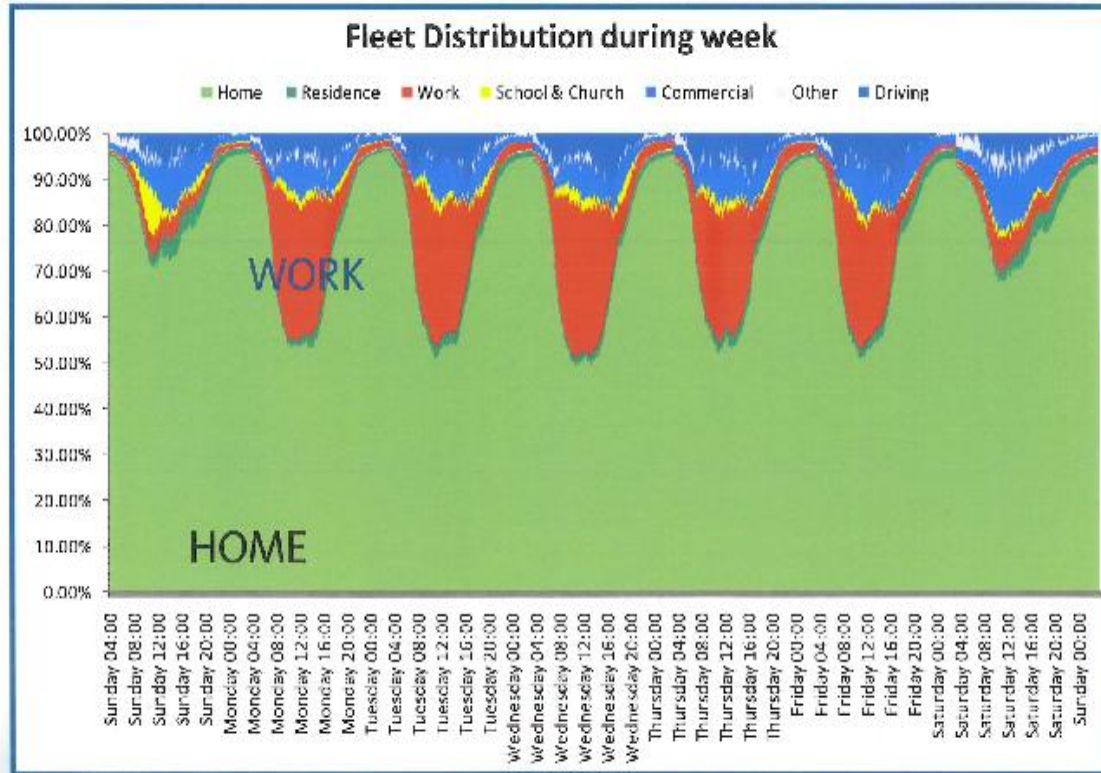
Early adopter demographics are expected to be similar to early Prius' buyers

- Initial clusters expected in and around major commuter communities along I 95 and among Baltimore suburbs, Washington D.C. and Annapolis
- As EV availability and options increase, buyer interest is expected to expand into a broader range
- Electric utilities are expecting to see the charging load in the early adopter pockets initially, rather than widespread across the area.



Sample representation of potential high adopter areas

Electric Vehicle Charging Priorities



Source of Data - 2001 National Household Travel Survey ; GM Data Analysis (Tate/Savagian) - SAE paper 2009-01-1311

Vehicle use patterns suggest charging priorities would be:

- At Home
- At Work / Fleets
- Public (longer stay)
- Public (fast charge)

Sample views of Level 2 Charging Stations



Level 1 : 120 volt, 20 amp 1.2 – 1.5 kW /hour draw

Level 2: 240 volt, 3.3 kW / hour draw

Level 2 : 240 volt, 6.6 – 7 kW / hour draw



Charging Stations in Maryland



Charge Point unit in
City Garage



Governor Martin O'Malley at
BEVI SemaConnect unit
installations at BWI airport



BEVI Installations at
Whitemarsh MTA site



Voltec unit in BGE
Headquarters Garage

Solar PV with
EV Charging in
Bethesda



GM's Comparison of Volt Energy Use

How Does a Chevrolet Volt Compare?

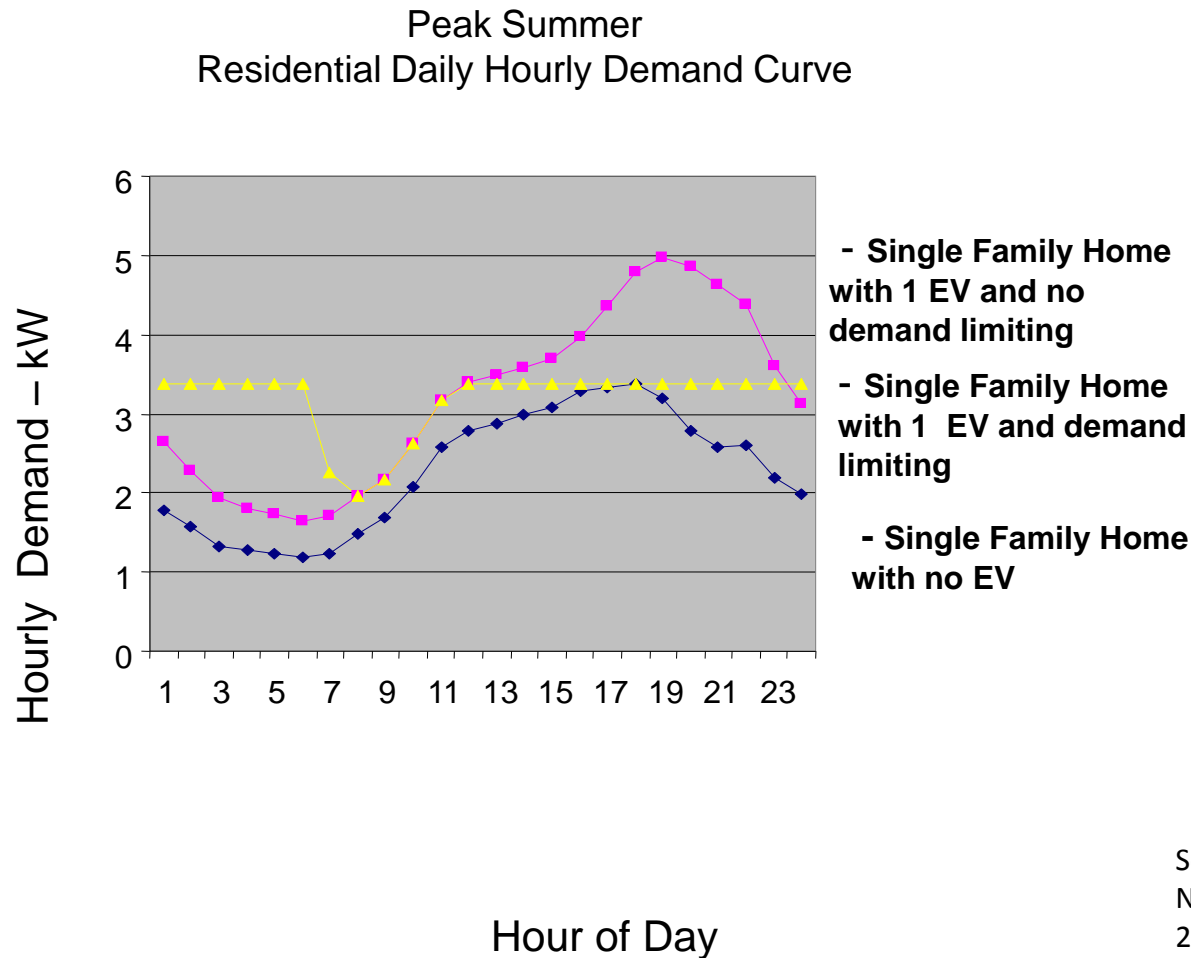
Annual Energy Usage – Electrical Appliances



From presentation by Kristin B. Zimmerman, Ph.D.
General Motors Research & Development
Volt Infrastructure Team

Baltimore County EV Roundtable
June 2010

PEV Charging Impacts on Household Demands

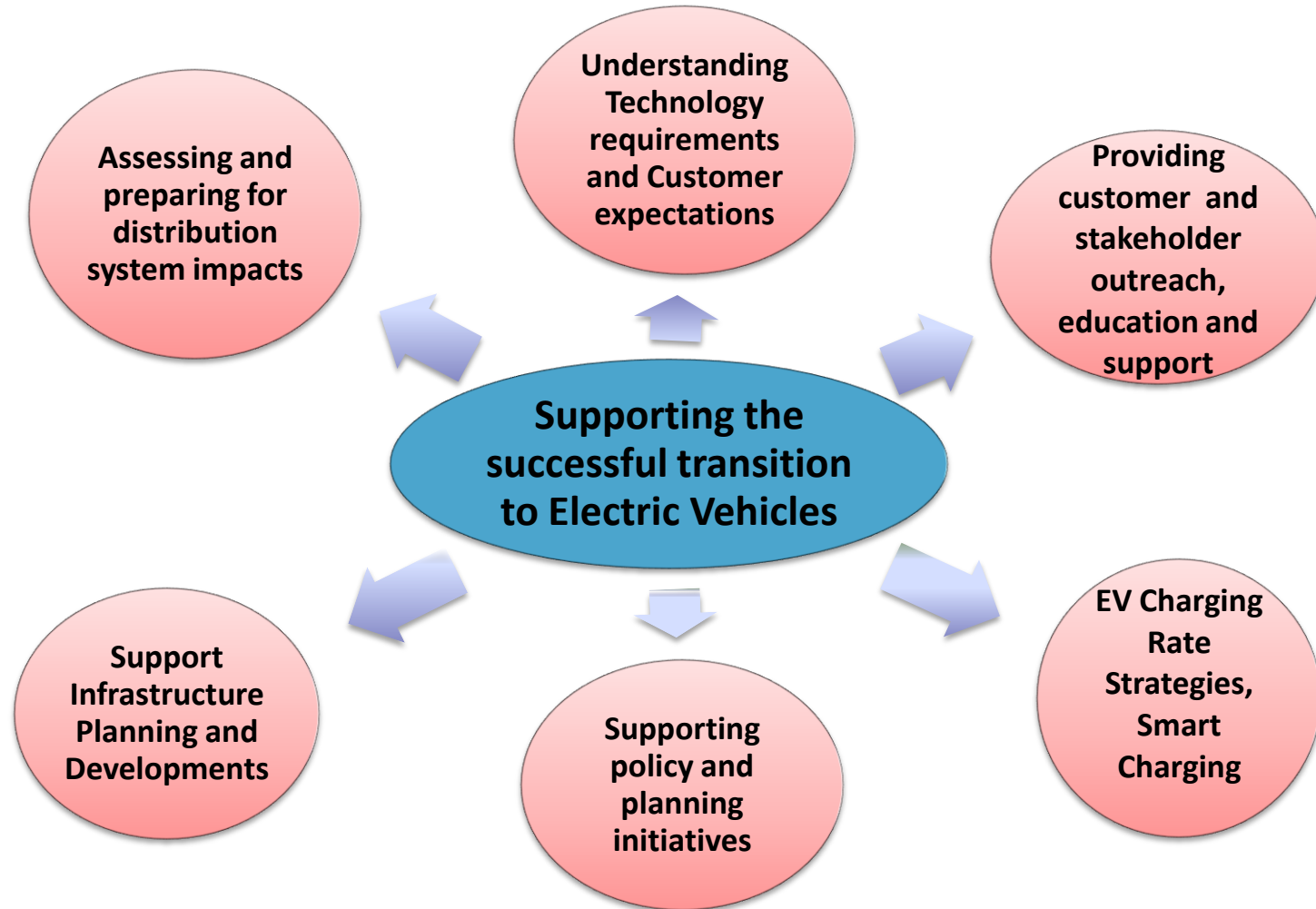


- PEV charging could add 50 - 100% to a typical household peak demand.
- Electric utilities and key stakeholders are developing strategies for serving and managing the added load

Source: Hadley & Tsvetkova, Oak Ridge National Laboratory January 2008 ORNL/TM - 2007/150

- Time of day rates
- Demand Response
- Manage with load in house
- Manage with load on system
- Availability of renewables
- Fleet charge management
- Accurate metering without the meter
- Vehicle to Grid support (future)

BGE's EV Strategy



Key Issues and Opportunities

- Customer Awareness Development, Education and Support
 - Individual, Fleet & Government applications
- Coordinated Infrastructure Planning
- Easing perceived barriers in permitting and inspection processes
 - Multiple standards, training on the new technology applications
 - Consider if new codes are needed
- Integrating EV use with clean energy supplies and electric distribution systems

Wrap-Up

- Electric Vehicles are here!
- EV Readiness presents some exciting challenges
- Good things are happening – with more to come
- Collaborative effort is needed to assure a successful customer experience
- Significant new opportunities for stakeholders and consumers